

REMARKS

In an Office Action mailed April 13, 2010, claims 1-4 of the present application were rejected. Applicants respectfully request reconsideration based on the following remarks.

I. Prosecution History of the Present Application

A first Office Action on the merits was mailed on February 5, 2009 in which claims 1-4 were rejected. An Amendment was filed in response on June 4, 2009, in which a minor claim amendment was made to claim 1 in order to improve its US form along with remarks asserting the patentability of the claimed invention.

A Final Office Action was mailed on September 11, 2009 maintaining the rejection of claims 1-4. An After-Final Amendment was filed in response on February 12, 2010, in which a replacement sheet for Figure 1 was provided to correct a clerical error, a Declaration under Rule 1.132 was provided presenting evidence for the patentability of the claimed invention, and remarks were provided asserting the patentability of the claimed invention.

An Advisory Action was mailed on February 25, 2010 maintaining the rejection of claims 1-4, and indicating that the Declaration under Rule 1.132 would not be entered. A Request for Reconsideration was filed in response on March 11, 2010, along with a Request for Continued Examination requesting entry of the Declaration under Rule 1.132, in which remarks were provided asserting the patentability of the claimed invention.

A non-final Office Action was mailed on April 13, 2010 maintaining the rejection of claims 1-4. The remarks presented herein are in response to the non-final Office Action.

II. Claim Rejections under 35 U.S.C. 103(a)

Claims 1-4 were rejected under 35 U.S.C. 103(a) as being unpatentable over Badard (WO 03/012156). Reconsideration of the above rejection is requested in view of the following.

Claim 1 recites steel for mechanical components, wherein the composition thereof is, in percentages by weight: $0.19\% \leq C \leq 0.25\%$; $1.1\% \leq Mn \leq 1.5\%$; $0.8\% \leq Si \leq 1.2\%$; $0.01 \leq S \leq$

0.09%; trace levels $\leq P \leq 0.025\%$; trace levels $\leq Ni \leq 0.25\%$; $1\% \leq Cr \leq 1.4\%$; $0.10\% \leq Mo \leq 0.25\%$; trace levels $\leq Cu \leq 0.30\%$; $0.010\% \leq Al \leq 0.045\%$; $0.010\% \leq Nb \leq 0.045\%$; $0.0130\% \leq N \leq 0.0300\%$; and optionally trace levels $\leq Bi \leq 0.10\%$ and/or trace levels $\leq Pb \leq 0.12\%$ and/or trace levels $\leq Te \leq 0.015\%$ and/or trace levels $\leq Se \leq 0.030\%$ and/or trace levels $\leq Ca \leq 0.0050\%$.

Applicants acknowledge that ranges of certain elements of the claimed steel composition lie within corresponding ranges disclosed by Badard. However, Applicants emphasize that the particular ranges of claim 1 achieve unexpected results relative to the broader prior art range.

MPEP 2144.05(I) states that a prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness. However, MPEP 2144.05 (III) provides that an applicant can rebut a *prima facie* case of obviousness by showing that the claimed invention achieves new and unexpected results relative to the prior art.

In the Amendment filed on June 4, 2009, the After Final Amendment filed on February 12, 2010, and the Request for Reconsideration filed on March 11, 2010, Applicants presented remarks explaining the unexpected results of the presently claimed invention relative to the prior art. In particular, Applicants noted that the ranges recited by claim 1 are critical to producing an optimal Jominy curve for a steel composition, and that the selection of the contents of the main alloy elements is intended to achieve a Jominy curve with no significant marked inflection point. Applicants noted that page 6 of the specification discloses the benefits of such a Jominy curve as allowing minimal deformation to be achieved during a quenching operation.

Additionally, Applicants have presented comparative examples in view of Figure 1 of the present application. In particular, Applicants noted that the curves corresponding to the samples within the claimed range (i.e., curves E, F, and G) lack a significantly marked inflection point in contrast to the curves corresponding to the samples outside the claimed range (i.e., curves A, B, C, and D). Applicants stressed that the curves corresponding to the samples within the claimed

ranges are straighter and less steep, thereby indicating that the hardness is less dependent on the depth at which it is measured.

In response to Applicants arguments, the Examiner considers that the curves corresponding to samples within the claimed ranges (i.e., curves E, F, and G) have an inflection point, and thus, the Examiner states that it is unclear what the patentable distinction is between the inventive steels and the comparative steels (Office Action, Page 9). Additionally, the Examiner states that “even if one was to concede that certain inventive steels have clearly distinct advantages in terms of lack of inflection point, greater hardness, etc, the nature of the inventive and comparative examples lack sufficient data to show such advantages among compositions comparable in scope to the claims” (Office Action, Page 9). Applicants respectfully disagree with Examiner’s above positions based on the following.

Applicants note that the lack of any inflection point is not presently claimed, but is a consequence of the claimed steel composition and adjustment thereof as a result of the mean values for five Jominy tests according to the formula recited by claim 1. In this regard, Applicants note that the claimed steel composition and adjustment thereof produces the Jominy curves as shown in Figure 1, in which curves corresponding to sample steels within the claimed steel composition (i.e., curves E, F, and G) illustrate a lack of a significant inflection point, along with a quasi-rectangular shape and gentle slope, relative to the curves corresponding to the reference steels outside the claimed steel composition (i.e., curves A, B, C, and D).

In the Office Action, the Examiner appears to rely exclusively on the features of a curve without reasonably taking into account the typical precision as a result of hardness measurements. In other words, Applicants respectfully submit that the Examiner narrowly focuses on the presence or absence of a slight inflection point without consideration that Figure 1 illustrates a clear difference between the curves corresponding to the inventive steels and the curves corresponding to the reference steels.

In this regard, page 6 of the specification states that a composition of steel which produces a Jominy curve with no inflection point is advantageous for greatly reducing

deformations during a quenching operation following a carburizing operation, and page 14 of the specification states that curves E, F, and G are defined as having no marked points of inflection. As such, it is apparent that the specification indicates that the inventive steel compositions corresponding to curves E, F, and G are to be interpreted as having no marked points of inflection. Therefore, in view of pages 6 and 14 of the specification, the inventive samples corresponding to curves E, F, and G greatly reduce deformation during a quenching operation following a carburizing operation relative to the reference samples corresponding to curves A, B, C, and D, regardless of whether curves E, F, and G have a slight point of inflection.

Additionally, Applicants note that pages 14-22 of the specification describe various carburizing tests in which the inventive steel compositions are compared to the reference steel compositions. For example, the specification indicates that the inventive steel compositions reduce carburizing time (pages 20 and 21), increase carburizing depth (page 18, 21), improve core hardness (pages 16, 18), improve energy at break (pages 20 and 21), and increase the fatigue properties (pages 17, 19, 22) relative to the reference steel compositions.

Further, Applicants note that the Declaration under Rule 1.132 describes the advantages of the inventive steel compositions over the reference steel compositions with reference to Figure 1.

In view of the above remarks and the previously provided Declaration under Rule 1.132, Applicants respectfully submit that the steel composition ranges of claim 1 achieve unexpected results relative to the broader prior art range disclosed by Badard. Therefore, claim 1 is patentable over Badard.

Further, claims 2-4 are patentable over Badard based at least on their dependency from allowable claim 1.

III. Conclusion

In view of the foregoing remarks, Applicants respectfully submit that claims 1-4 are clearly in condition for allowance. An early notice thereof is earnestly solicited.

If, after reviewing the above remarks, the Examiner believes that there are any issues remaining which must be resolved before the application can be passed to issue, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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